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EXAMINER	
TARANINA, MARINA Y	

ART UNIT	PAPER NUMBER
2613	

DATE MAILED: 11/15/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/696,375	ODATE ET AL.	
	Examiner	Art Unit	
	Marina Taranina	2613	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *29 OCt 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-48* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-48* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *29 October 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *29 oct 2003*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

1. Claims 5, 8 (8/5), 22, 31, 42, 43 (43/42) and 44 (44/42), 46 and 47 are objected to because of the following informalities:

(1) Claims 5 and 22: misspelling (replace "several point" recited in line 2 with "several points").

(2) Claim 31: misspelling (replace "amplifiers" recited in line 1 of the claim with "amplifier"). Appropriate correction is required.

(3) Claim 42: replace "second amplifier" recited in line 1 with "an amplifier" in order to make a proper antecedent basis for the recitation, as the term "first amplifier" has not been introduced in the parent Claim 25.

(4) Claim 46: replace "plurality of second amplifiers" recited in lines 1-2 with "plurality of amplifiers" in order to make a proper antecedent basis for the recitation, as the terms "first amplifier" or "second amplifier" have not been introduced in the parent Claim 25.

(5) Claim 47: replace "plurality of first amplifiers" recited in lines 1-2 with "plurality of amplifiers" in order to make a proper antecedent basis for the recitation, as the term "first amplifier" has not been introduced in the parent Claim 25.

Appropriate corrections are required.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 6, 23, 33 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The phrase "a substantial length" renders the claims indefinite.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-12, 14, 15, 17, 20-39 and 47 are rejected under 35 U.S.C. 103(a) as being unpatentable over Naito (US 5 877 879) in view of Ishikawa (US 5 717 510).

(1) With respect to Claims 1, 20 and 25, Naito discloses an optical communication system, comprising:

an optical link (38) with a first end (2) and a second end (40) (fig. 14, 17, col. 8 lines 50-53);

a first dispersion device proximate the first end of the optical link (6-1 in fig. 1 and 17) configured to pre-distort for dispersion optical information signals transmitted over the optical link coupled to the optical link (col. 5 lines 47-55);
and a second dispersion device (52-5 in fig. 17 or 44-1 in fig. 17), proximate the second end of the optical link configured to compensate for dispersion optical information signals and coupled to the optical link (col. 9 lines 27-32 and col. 8 lines 58-60).

Naito fails to teach that the first and second dispersion devices have opposite polarities of dispersion.

However, Ishikawa teaches a first dispersion device proximate the first end of the optical link and a second dispersion device proximate the second end of the optical link have opposite polarities of dispersion (col. 21 lines 36-38).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the system of Naito by installing first and second dispersion devices having opposite polarities of dispersion as taught by Ishikawa as to optimize the system performance.

(2) With respect to Claims 2 and 26, Naito discloses the first dispersion device (6-1) located at a node in a first office including a transmitter (fig. 1 and 17, col. 5 lines 42-50).

(3) With respect to Claims 3 and 28, Naito discloses the second dispersion device (44-1) located at a node in a second office including a receiver (fig. 14, 17, col. 8 lines 58-60).

(4) With respect to Claims 4 and 21, Naito discloses means for amplifying the optical signal in-line without dispersion compensating modules (48 in fig. 15, col. 9 lines 4-7).

(5) With respect to Claims 5 and 22, Naito discloses means for amplifying the optical signal in-line at several points without dispersion compensating modules (48 in fig. 15, col. 9 lines 4-7).

(6) With respect to Claims 6 and 23, Naito discloses means for amplifying the optical signal in-line over a substantial length of the optical link between a transmitter and a receiver without dispersion compensating modules (48 in fig. 15, col. 9 lines 4-7).

(7) With respect to Claims 7, 24 and 38, Naito discloses a first amplifier proximate the first end of the optical link in connection with the first dispersion device (34-1 in fig. 13, col. 8 lines 38-39).

(8) With respect to Claims 9 and 37, Naito discloses the first dispersion device (6-1 in fig. 17) proximate the first end of the optical link (2 in fig. 17) configured to pre-distort for dispersion optical information signals transmitted over the optical link (38 in fig. 17) is a optical fiber (1.3 mkm zero-dispersion fiber, col. 6 lines 7-9) with a same polarity (positive) as the optical link (SMF, col. 8 lines 51-53) at a transmitted wavelength (when .lambda. < .lambda.0. in fig. 2, col. 5 line 67 – col. 6 line 3).

(9) With respect to Claims 10 and 34, Naito discloses the system wherein the optical information is signal is transmitted over a 200 kilometer section of the optical link without transmitting over a dispersion compensating module (col. 9 lines 4-7).

(10) With respect to Claims 11 and 35, Naito discloses the system wherein the optical information is signal is transmitted over a 500 kilometer section of the optical link without transmitting over a dispersion compensating module (col. 9 lines 4-7).

(11) With respect to Claims 12 and 36, Naito discloses the system wherein the optical information is signal is transmitted over a 1000 kilometer section of the optical link without transmitting over a dispersion compensating module (col. 9 lines 4-7).

(12) With respect to Claim 14, Naito discloses the optical information signal compensated proximate the second end of the optical link for dispersion by a dispersion compensating module (52-5 in fig. 17, col. 9 lines 27-32).

(13) With respect to Claim 15, Naito discloses amplifying the signal (48m in fig. 17) proximate the second end of the optical link (40 in fig. 17) in connection with compensating the optical signal (52-5 in fig. 17, col. 9 lines 25-29).

(14) With respect to Claim 27, Naito discloses the transmitter (2 in fig. 1) comprising one or more optical transmitters (4 in fig. 1) coupled (via 6 in fig. 1) to a wavelength division multiplexed multiplexer (8 in fig. 1) (col. 5 lines 42-45, 50).

(15) With respect to Claim 29, Naito discloses the receiver (40 in fig. 14) comprising a wavelength division multiplexed demultiplexer (42 in fig. 14, col. 8 lines 53-57) coupled (via 44 in fig. 14) to one or more optical receivers (46 in fig. 14, col. 8 lines 61-62).

(16) With respect to Claim 30, Naito discloses all the subject matter as recited in claim 29, but fails to teach one or more variable dispersion compensators coupled to the one or more optical receivers at the second end of the optical link.

However, Ishikawa teaches a variable dispersion compensator (101 in fig. 14) coupled to an optical receiver at the second end of the optical link (col. 15 lines 62-64).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the system of Naito by using variable dispersion compensator as taught by Ishikawa as to optimize transmission conditions by the compensator's capability to adjust the wavelength dispersion.

(17) With respect to Claim 31, Naito discloses the system of claim 25, and further teaches the system without dispersion compensating modules coupled to the optical link (fig. 14, col. 8 lines 51-53). Naito fails to teach one in-line amplifier coupled to the optical link.

However, it is well known in the art that the amplifiers are inserted in the optical links based on system design, transmission parameters and the link length.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the system of Naito by placing one in-line amplifier as to increase the transmission distance.

(18) With respect to Claim 32, Naito discloses several in-line amplifiers (48-10, 48-20 in fig. 17) with dispersion compensating modules (52-1, 52-2 in fig. 17) coupled to the optical link (col. 9 lines 27-30).

(19) With respect to Claim 33, Naito discloses several in-line amplifiers (48-10, 48-20 in fig. 17) with dispersion compensating modules (52-1, 52-2 in fig. 17) interposed along a substantial length of the optical link between a transmitter and a receiver (as disclosed in col. 9 lines 4-7 - see also col. 2 lines 15-20 for background of

the experiment - the dispersion remains compensated after 8000 km transmission, meaning that for distances over 8000 km (substantial length), the additional dispersion compensation is needed).

(20) With respect to Claim 47, Naito discloses plurality of first amplifiers (34 in fig. 13) with a plurality of dispersion compensators (6 in fig. 13) proximate the first end of the optical link (at the transmitter) configured to pre-distort for dispersion optical information signals (col. 8 lines 37-38).

(21) With respect to claims 8 (8/5/1), 17 (17/15/1) and 39 (39/38/25), Naito discloses all the subject matter of the corresponding preceding claims, but fails to specify that the amplifier is an erbium-doped fiber amplifier.

However, Ishikawa teaches an erbium-doped fiber amplifier (EDFA) installed in various parts of the fiber link (104 in fig. 52).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to include EDFA as taught by Ishikawa into the system of Naito in order to simplify the system (as no opto-electrical conversion is needed) and, therefore, to improve cost-effectiveness of the system.

3. Claims 13, 16, 40, 42, 43 and 44 are rejected under 35 U.S.C. 103(a) as being unpatentable over Naito (US 5 877 879) in view of Ishikawa (US 5 717 510) further in view of Ryabon ("160Gb/s TDM transmission over record length of 400 km fiber using distributed Raman amplification only" – see IDS dated 10/29/2003).

(1) With respect to claim 13, Naito and Ishikawa disclose all the subject matter of the claim 1, but fail to teach the system wherein the optical information signal has a bit

rate of 40 Gb/s or above.

However, Ryabon teaches the system wherein the optical information signal has a bit rate of 40 Gb/s or above (page 214, para "transmission experiment").

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the system of Naito and Ishikawa by applying the system with optical information having a bit rate 40 Gb/s or above as taught by Ryabon in order to realize next generation fiber transmission system.

(2) With respect to claim 42 (42/25), Naito and Ishikawa disclose all the subject matter of the preceding claim, but fail to teach an amplifier proximate the second end of the optical link in connection with the second dispersion device.

However, Ryabon teaches an amplifier (EDFA in fig. 1) proximate the second end of the optical link (Rx in fig. 1) in connection with the second dispersion device (DCF in fig. 1) (page 215 line 12).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to include an amplifier proximate the second end of the optical link in connection with the dispersion device as taught by Ryabon into the system of Naito and Ishikawa in order to optimize transmission parameters at the receiver.

(3) With respect to claims 16 (16/15/1), 40 (40/38/25) and 43 (43/42/25), Naito and Ishikawa disclose all the subject matter of the corresponding preceding claims, but fail to specify that the amplifier is a distributed Raman amplifier (DRA).

However, Ryabon teaches a distributed Raman amplifier (DRA) installed in various parts of the fiber link (fig. 1, page 215, summary).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to include DRA as taught by Ryabon into the system of Naito and Ishikawa in order to improve the system performance.

4. Claims 19 and 46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Naito (US 5 877 879) in view of Ishikawa (US 5 717 510) further in view of Cao (US 6 731 877).

(1) With respect to claims 19 (19/1) and 46 (46/25), Naito and Ishikawa disclose all the subject matter of the corresponding preceding claims, and further teach a plurality of dispersion compensators proximate the second end of the optical link configured to compensate for dispersion optical information (44 in fig. 17, col. 9 lines 27-29). Naito and Ishikawa fail to teach a plurality of amplifiers proximate the second end of the optical link.

However, Cao teaches a plurality of amplifiers (34 and 40 in fig. 1-B) proximate the second end of the optical link (14 in fig. 1-B) (col. 7 lines 49-53).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to include a plurality of amplifiers proximate the second end of the optical link as to improve transmission parameters before signal processing at the receiver.

5. Claims 18, 41 and 45 are rejected under 35 U.S.C. 103(a) as being unpatentable over Naito (US 5 877 879) in view of Ishikawa (US 5 717 510) further in view of Kawakami (US 6 263 139).

(1) With respect to claim 41, Naito and Ishikawa disclose all the subject matter of the corresponding preceding claims, Naito further teaches the second dispersion device proximate the second end of the optical link configured to compensate for dispersion optical information signals is a dispersion compensating module (52-5 in fig. 17, col. 9 lines 27-32).

Naito and Ishikawa do not specify that the second dispersion device has a polarity opposite the optical link.

However, Kawakami teaches a dispersion compensating module with a polarity opposite the optical link (41 in fig. 2, col. 4 lines 34-38, 41-45, 59-64, claim 2).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the system of Naito and Ishikawa by employing a compensating module as taught by Kawakami as to achieve improved transmission parameters.

(2) With respect to claims 18 (18/14/1) and 45 (45/41/25), Naito and Ishikawa disclose all the subject matter of the corresponding preceding claims, but fail to teach that the dispersion compensating module comprises Raman amplified dispersion compensating fiber (DCFRA).

However, Kawakami teaches a dispersion compensating module comprising Raman amplified dispersion compensating fiber (col. 4 lines 61-63).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the system of Naito and Ishikawa by using Raman amplified dispersion compensating fiber as taught by Kawakami in order to improve performance of an optical transmission line by improving signal-to-noise ratio and suppressing non-linear effects occurring in a dispersion compensating fiber.

6. Claim 48 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chraplyvy (US 5 559 920) in view of Naito (US 5 877 879) and Kawakami (US 6 263 139).

With respect to Claim 48, Chraplyvy discloses an optical communication system, comprising:

a transmitter (32 in fig. 2) operable to multiplex a plurality of optical information signals and generate wavelength division multiplexed (WDM) signals (21 in fig. 2, col. 5 lines 8-10);

an optical link operable to transmit the WDM signals, wherein the transmitter is coupled to one end of the optical link and a receiver is coupled to the other end (fig. 2);

a first dispersion device fiber (30 in fig. 2) with a polarity the same as the optical link (col. 4 line 66 - col. 5 line 1, transmission fiber being a positive dispersion fiber, col. 4 lines 64-65) operable to pre-distort for dispersion the WDM signal and coupled to the optical link proximate the transmitter (col. 5 lines 15-17);

a plurality of in-line amplifiers coupled to the optical link (AMP in fig. 2);

a second dispersion device (31 in fig. 2) operable to compensate for dispersion the WDM signals and coupled to the optical link proximate the receiver (col. 5 lines 15-17); and the receiver (33 in fig. 2) operable to demultiplex the WDM signals (col. 5 lines 9, 12).

Chraplyvy does not teach (A) an optical link without dispersion compensating modules and (B) a dispersion compensating device at the receiving part of an optical link with a polarity opposite the optical link.

However, Naito teaches (A) an optical link without dispersion compensating modules (fig. 15, col. 9 lines 4-7).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify system of Chraplyvy by using optical link without dispersion compensating modules as to simplify the system design and to reduce the overall system cost.

Furthermore, Kawakami teaches (B) a dispersion compensating device at the receiving part of an optical link with a polarity opposite the optical link (41 in fig. 2, col. 4 lines 34-38, 41-45, 59-64, claim 2).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the system of Chraplyvy and Naito by employing a dispersion compensating module as taught by Kawakami as to achieve improved transmission parameters while simplifying the system design and reducing the overall system cost.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

US 5 877 881, US 6 427 043, US 6 681 082 and US 6 404 950 disclose dispersion compensation methods and systems.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Marina Taranina whose telephone number is (571) 270-1085. The examiner can normally be reached on Mon-Fri (alternative Fri off).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kenneth Vanderpuye can be reached on (571) 272-3078. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

MT
10 Nov 2006

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SUPERVISORY PATENT EXAMINER